

# High Turndown Ratio, High Delta-Emittance, Variable Emissivity Electrochromics, Phase I

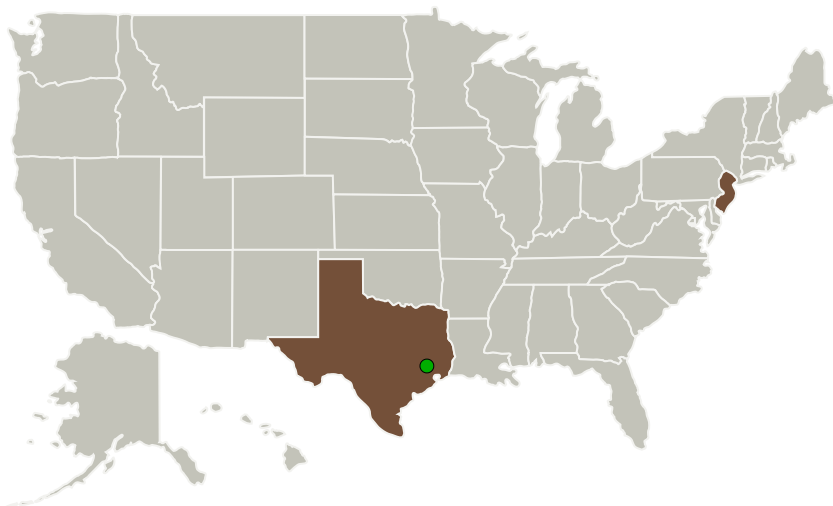
Completed Technology Project (2011 - 2011)



## Project Introduction

Variable-emittance materials are in high demand for applications ranging from manned and unmanned space platforms (e.g. in radiators at the Moon's poles where damage could be prevented during times of low heat load) to spacecraft thermal control (especially for micro-, nano-spacecraft where no effective thermal control currently exists). They are superior to technologies such as loop heat pipes, louvers, MEMS systems, electrostatic systems, phase change materials, and others. A key requirement is a high Turn-Down Ratio (TDR, ratio of high/low emittance), up to 10.0, and Delta-emittance, up to 0.55. In ongoing and recent prior work (for Air Force, JPL, NASA), this firm has developed a novel, patented variable emittance skin technology, based on conducting polymers (CPs), microporous membranes and ionic liquids, with proven, space-environment performance. The proposed work will develop this with further, radical innovations including entirely new CPs, to achieve a TDR of ca. 8.0 and possibly up to (from current ca. 3.0), and Delta-emittance of ca. 0.60 (from current ca. 0.50). The more than eight innovations are based on actual, prior experimental data and include incorporation of new CPs, alteration of the substrates and surfaces, radical increase in doping level, use of new ionic liquid electrolytes with higher conductivity and several others.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Ashwin-Ushas Corp, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Holmdel, New Jersey
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

## Primary U.S. Work Locations

New Jersey	Texas
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## Project Transitions

**February 2011:** Project Start**August 2011:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140165>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Ashwin-Ushas Corp, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Prasanna Chandrasekhar

**Co-Investigator:**

Prasanna Chandrasekhar

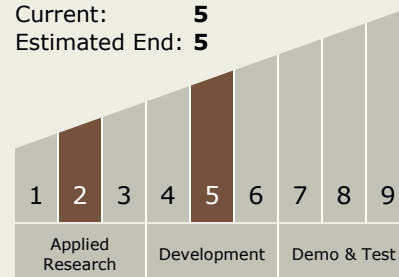
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## Technology Maturity (TRL)

Start: 2  
Current: 5  
Estimated End: 5



## Technology Areas

### Primary:

- TX14 Thermal Management Systems
  - └ TX14.2 Thermal Control Components and Systems
    - └ TX14.2.3 Heat Rejection and Storage

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System